

REMARKS

Claims 1-15 are currently pending in the application, of which claims 1 and 10 are independent claims.

Entry of the Remarks is respectfully requested because entry places the present application in condition for allowance, or in the alternative, better form for appeal. In view of the following Remarks, Applicants respectfully request reconsideration and timely withdrawal of the pending rejections for the reasons discussed below.

Responses to Examiner's Arguments

The Examiner has kindly responded to several of the Applicants' arguments. Office Action, p. 8-10. However, these arguments, it is respectfully noted, each contain flaws.

The Examiner should recognize that element (6) of U.S. Patent No. 6,645,402 issued to Kurokawa, *et al.* ("Kurokawa") is not a surface treatment agent, nor is it deposited on the substrate to cover the emitter. As explained in *Kurokawa*, "reference numeral (6) represents an organic material contained in the solution in which the graphite particles (3) were dispersed." *Kurokawa*, Col. 8, ll. 61-64.

Hydrogen plasma is used to try to remove organic material (6) from the graphite particles. *Kurokawa*, Col. 8, l. 67 – Col. 9, l. 1. If done as *Kurokawa* suggests, some of the organic material (6) is removed by decomposition, and some is carbonized into a carbide (8), as shown in FIG. 5. *Kurokawa*, Col. 9, ll. 4-8.

FIG. 5 shows the carbide (8) directly between the substrate (2) and the graphite particle (3). *Kurokawa*, FIG. 5. Thus, the carbide (8) cannot be the hardened surface treatment agent because it does not cover the emitter.

Additionally, there is no indication that the organic material (6) except for the carbide (8) has **any effect whatsoever** on the surface of the emitter. Even more tellingly, *Kurokawa* never describes element (6) as a surface treatment agent. The reason is evident – it is not a surface treatment agent.

The Examiner continues to also assert that it would be obvious to combine U.S. Patent No. 6,436,221 issued to Chang, *et al.* (“*Chang*”) and *Kurokawa*. However, the Examiner’s logic is again, respectfully, flawed. The Examiner states that both references deal with field emission devices. Next the Examiner asserts that it would have been obvious to substitute adhesive resin in place of the hardened tape of *Chang*.

There is, however, no basis for this assertion. *Chang* teaches using a hardened tape. *Chang*, Abstract. The taping process is so central to *Chang*’s description that it is mentioned in the first sentence of the abstract. *Id.* It is also mentioned in **both** of the benefits allegedly provided by *Chang*. *Chang*, Col. 4, ll. 27-34. Moreover, taping is an element of the broadest independent claim of *Chang*. *Chang*, Col. 4, l. 54. In sum, taping is the central feature of *Chang*. To assert that it would be obvious to modify the central feature of *Chang*, because such a modification would be beneficial is not credible.

Moreover, as explained below in greater detail, *Kurokawa* cannot assist *Chang* by remedying its shortcomings. Specifically, *Kurokawa* doesn’t appear to teach applying an adhesive resin surface treatment as proposed by the Examiner. Office Action, p. 10. Thus, even if one combined *Kurokawa* and *Chang* one wouldn’t have the claimed invention.

Furthermore, Applicants respectfully request clarification as to which contours of the apparatus the Examiner refers when suggesting that the tape would need to be bent or otherwise processed to conform to the contour of the apparatus. Office Action, p. 10.

Rejections Under 35 U.S.C. §102

Claims 1-2, 4-6, 10-11, and 15 stand rejected under 35 U.S.C. §102(e) as being anticipated by *Kurokawa*. Applicants respectfully traverse this rejection for at least the following reasons.

In order for a reference to anticipate, it must teach each and every element of the claimed invention. As will be explained in detail below, *Kurokawa* does not anticipate because it does not teach each and every element of the claims.

With regard to claims 1-2, and 4-6, *Kurokawa* does not anticipate because it does not teach “depositing an emitter surface treatment agent on the substrate to cover the emitter.”

Claim 1. In particular, the cited portion of the cited reference (element “6” in the drawings) is not a surface treatment agent deposited on a the substrate to cover the emitter. As the cited reference explains: “reference numeral 6 represents an organic material contained in the solution in which the graphite particles 3 were dispersed.” (Col. 8, ll. 60-64). Thus, according to the cited reference, this is part of the solution that was applied to the chromium electrode by uniform dispersion. (Col. 8, ll. 52-56). Applicants respectfully suggest that this looks more like the step of forming an emitter. In particular there is no indication that “6” is a surface treatment agent. Accordingly the cited reference does not teach the step of “depositing an emitter surface treatment agent on the substrate to cover the emitter” as required by the claims. Thus, because it does not teach at least this element of claim 1, *Kurokawa* does not anticipate claim 1, or any of its dependent claims.

With regard to claims 10-11 and 15, *Kurokawa* does not anticipate because it does not teach “forming a surface treatment agent over the emitter.” Claim 10. In particular, the cited portion of the cited reference (element “6” in the drawings) is not a surface treatment agent

formed over the emitter. As the cited reference explains: “reference numeral 6 represents an organic material contained in the solution in which the graphite particles 3 were dispersed.” (Col. 8, ll. 60-64). Thus, according to the cited reference, this is part of the solution that was applied to the chromium electrode by uniform dispersion. (Col. 8, ll. 52-56). Applicants respectfully suggest that this looks more like the step of forming an emitter. In particular there is no indication that “6” is a surface treatment agent. Accordingly the cited reference does not teach the step of “forming a surface treatment agent over the emitter” as required by the claims. Thus, because it does not teach at least this element of claim 10, *Kurokawa* does not anticipate claim 10, or any of its dependent claims.

Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. §102(e) rejection of claims 1-2, 4-6, 10-11 and 15. Since none of the other prior art of record discloses or suggests all the features of the claimed invention, Applicants respectfully submit that independent claims 1 and 10, and all the claims that depend from them are allowable.

Rejections Under 35 U.S.C. §103

Claims 1-4 and 8 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Chang* in view of *Kurokawa*. Applicants respectfully traverse this rejection for at least the following reasons.

In order for a combination of references to render the claimed invention obvious they must together teach all of the elements of the claimed invention and there must be teaching, motivation or suggestion found in the art to combine the references.

The cited references do not render the claims of the present application obvious because they do not teach or suggest the element “depositing an emitter surface treatment agent on the

substrate to cover the emitter.” In particular *Chang* does not teach this element. *Chang*, in the cited portion, describes an adhesive film that may be implemented by a limited number of techniques, namely by a laminator, by a rubbing process, or by a press print. None of these techniques appear to be deposition techniques. Some examples of deposition techniques include the following: vapor deposition (p. 1, ll. 19-20), plasma chemical vapor deposition (p. 2, ll. 7-8), and spin coating (p. 3, ll. 20-21).

Moreover, even assuming, *arguendum*, that the lamination, rubbing, or press printing techniques are deposition techniques, (and further assuming, again *arguendum*, that the tape described is a surface treatment agent) the Examiner would then be correct in noting that *Chang* does not teach hardening the emitter surface treatment agent. Moreover, further assuming *arguendum* that *Kurokawa* teaches hardening a layer generally, there is no motivation to combine the two references. Applicants note that it appears that the tape (as described in *Chang*) would have to be hardened before use in order to work in a laminator or press printing process. As the Examiner notes, one object that is frequently of concern to manufacturers is eliminating steps, and so there is no reason to reduce efficiency by hardening already *Chang*’s sufficiently hard tape.

Kurokawa does not remedy the deficiencies of *Chang* with regard to either the step of depositing an emitter surface treatment agent on the substrate to cover the emitter or the step of hardening the emitter surface treatment agent. As explained above, *Kurokawa* does not even teach depositing an emitter surface treatment agent, much less hardening such a layer.

Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. §103(a) rejection of claims 1-4 and 8. Since none of the other prior art of record, whether taken alone or in any combination, disclose or suggest all the features of the claimed invention, Applicants

respectfully submit that independent claim 1, and all the claims 2-9 that depend from it are also allowable.

Rejections Under 35 U.S.C. §103

Claims 7 and 12 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Kurokawa* in view of U.S. Patent No. 6,626,720 issued to Howard, *et al.* (“*Howard*”)¹.

Applicants respectfully traverse this rejection for at least the following reasons.

In order for a combination of references to render the claimed invention obvious they must together teach all of the elements of the claimed invention and there must be teaching, motivation or suggestion found in the art to combine the references.

As explained above with regard to independent claims 1 and 10, *Kurokawa* teaches neither “depositing an emitter surface treatment agent on the substrate to cover the emitter” nor “forming a surface treatment agent over the emitter” respectively. (Claim 7 depends from and contains all the limitations of claim 1, and claim 12 depends from and contains all the limitations of claim 10.) *Howard* does not remedy the deficiencies of *Kurokawa*. In particular, *Howard* teaches neither “depositing an emitter surface treatment agent on the substrate to cover the emitter” nor “forming a surface treatment agent over the emitter.” *Howard* provides a layer (“27”) that is described in *Howard* only as a sacrificial layer. Indeed, layer 27 is never described as a surface treatment layer, and it does not perform that function in *Howard*. In *Howard*, layer

¹ The Examiner identified U.S. Patent No. 6,623,720, however, Applicants believe this to be a typographical error. In any event, the arguments as applied to 6,626,720 apply with even greater force to 6,623,720. Applicants noted this error in their response to the prior office action, but note that the citation has not changed.

27 is used as a temporary spacer between layers 25 and 28. Indeed, in view of its use as a spacer, not a surface treatment agent, it is unsurprising that there is no hardening step taught by *Howard*. Thus, neither *Howard* nor *Kurokawa* teaches “depositing an emitter surface treatment agent on the substrate to cover the emitter” or “forming a surface treatment agent over the emitter.”

Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. §103(a) rejection of claims 7 and 12. Since none of the other prior art of record, whether taken alone or in any combination, discloses or suggests all the features of the claimed invention, Applicants respectfully submit that independent claims 1 and 10, and all the claims 2-9 and 11-15 that depend from them are allowable.

Rejections Under 35 U.S.C. §103

Claims 9 and 13-14 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Kurokawa* in view of U.S. Patent No. 6,013,238 issued to *Murata, et al.* (“*Murata*”). Applicants respectfully traverse this rejection for at least the following reasons.

In order for a combination of references to render the claimed invention obvious they must together teach all of the elements of the claimed invention and there must be teaching, motivation or suggestion found in the art to combine the references.

As explained above with regard to independent claims 1 and 10, *Kurokawa* teaches neither “depositing an emitter surface treatment agent on the substrate to cover the emitter” nor “forming a surface treatment agent over the emitter” respectively. (Claim 9 depends from and contains all the limitations of claim 1, and claims 13-14 depend from and contains all the limitations of claim 10.) *Murata* does not remedy the deficiencies of *Kurokawa*. In particular, *Murata* teaches neither “depositing an emitter surface treatment agent on the substrate to cover

the emitter" nor "forming a surface treatment agent over the emitter." *Murata* discusses the hot plate method of sintering (in the portion cited by the Examiner), but does not indicate that such a technique should be applied to a surface treatment agent, nor even that a surface treatment agent should be used. Thus, neither *Howard* nor *Kurokawa* teaches "depositing an emitter surface treatment agent on the substrate to cover the emitter" or "forming a surface treatment agent over the emitter."

Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. §103(a) rejection of claims 9 and 13-14. Since none of the other prior art of record, whether taken alone or in any combination, discloses or suggests all the features of the claimed invention, Applicants respectfully submit that independent claims 1 and 10, and all the claims that depend from them are allowable.

CONCLUSION

Applicants believe that a full and complete response has been made to the pending Office Action and respectfully submits that all of the stated objections and grounds for rejection have been overcome or rendered moot. Accordingly, Applicants respectfully submit that all pending claims are allowable and that the application is in condition for allowance.

Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact the Applicants' undersigned representative at the number below to expedite prosecution.

Prompt and favorable consideration of this Reply is respectfully requested.

Respectfully submitted,



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